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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,268	08/23/2005	Andreas Poppe	PAT-01050	4995
26922	7590	06/23/2006	EXAMINER	
BASF CORPORATION 1609 BIDDLE AVENUE WYANDOTTE, MI 48192			HU, HENRY S	
			ART UNIT	PAPER NUMBER

1713

DATE MAILED: 06/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/525,268

Applicant(s)

POPPE ET AL.

Examiner

Henry S. Hu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on Election of May 1, 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 26-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 and 30-32 is/are rejected.
- 7) ☒ Claim(s) 15 and 21 is/are objected to.
- 8) ☒ Claim(s) 1-32 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2-22-2005.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. This Office Action is in response to Election filed on May 1, 2006.

**Applicant's election of Group I (Claims 1-11, 20-24 and 31-32) is traversed with remarks on pages 1-3.** The traversal is on the ground(s) that it would not place an undue burden to search and examine the non-elected Group II (Claims 12-19 and 25), Group III (Claims 26-29) and Group IV (Claim 30) with Group I since they are so closely related in making surface-modified nanoparticles and its application therefrom. After a close examination on the content of each group, **Group II (product by process) and Group IV (composition) are now both rejoined with Group I** while the restriction of Group III is still sustained. Although a dispersion of Group III may contain the same surface-modified nanoparticles of Group I or Group II, the use of solvents and/or diluents renders the nanoparticles into a liquid form which **carries the fluidity nature** as known in the art and may be thereby for different application. Therefore, the scope of the claims, i.e., the metes and boundaries are distinct.

The requirement is now deemed proper and is therefore made FINAL. In summary, this application contains original **Claims 26-29**, which is drawn to an invention non-elected with traverse. **Claims 1-32 are now pending with only one independent claim (Claim 1), while non-elected Claims 26-29 are withdrawn from consideration by the examiner.** An action follows.

*Specification*

2. The disclosure is objected to because of the following informalities:

On **abstract page and may be throughout the specification**, the language of "...with (A), (B), and (C)" may render the claim **indefinite**. It is unclear that only one modifying group, a combination of two groups, or all the three groups are needed to cover the surface of nanoparticles. **Applicants are required to make clarification with support from specification.**

*Claim Objections*

3. Claims 15 and 21 are objected to because of the following informalities:

(a) On **Claim 15 at line 5**, the language of "an oxygen atom or a carbonyl group" may be improper and it may need to change to "an oxygen atom, a carbonyl group".

(a) On **Claim 21 at lines 3-4**, the language of "selected from main groups three to five and transition groups three to six and one and two of the periodic system of the elements, plus the lanthanoids" may be improper and it needs to be rewritten completely.

*Claim Rejections - 35 USC § 112*

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 1 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

(A) On **Claim 1 at line 2**, the wording of "**near**-completely" may render the claim **indefinite**. It is a relative term and it is thereby unclear where is the limit.

(B) On **both Claim 1 and Claim 12**, the language of "...with (A), (B), and (C)" may render the claim **indefinite**. Many options may be applied. For instance, only any one modifying group, a combination of any two groups, or all the three groups may be used to cover the surface of nanoparticles. **Applicants need to make clarification in this regard with support from specification.**

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. The limitation of parent *Claim 1* in present invention relates to surface-modified nanoparticles whose surface is "covered" completely or near-completely with:

(A) modifying groups which are attached covalently to the surface via at least one linking functional group (a) and contain at least one inert spacer group (b) and contain at least one reactive functional group (c) which is connected via the group (b) to the group (a) and is inert toward the reactive functional groups of the surface to be modified,

(B) modifying groups which are attached covalently to the surface via at least one linking functional group (a) and contain at least one inert group (d) attached to the surface via group (a) having a smaller hydrodynamic volume  $V_H$  than the inert spacer group (Ab), and

(C) modifying groups which are attached covalently to the surface via at least one linking functional group (a) which contains at least one silicon atom, contain at least one inert group (e) attached to the surface via group (a), and have a smaller hydrodynamic volume  $V_H$  than the modifying group (A).

See other limitations of dependent *Claims 2-25 and 30*.

7. Claims 1-6, 9-12, 20, 22 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Lesniak et al. (WO 97/38058).

Regarding the limitation of parent **Claim 1**, **Lesniak et al.** have already disclosed a process for preparing agglomerate-free “**nanoscalar**” iron oxide “**particles**” with a hydrolysis-resistant coating. Such a surface-modified coating is achieved by addition of a solution of a trialkoxsilane compound which has a hydrocarbon group (an inert group) bonded directly to Si (silicon atom) (as linking group). The key point is that to which silicon atom, at least one functional group such as: (A) amino group, (B) carboxyl group, (C) epoxy group, (D) mercapto group, (E) cyano group, (F) hydroxyl group and/or (G) (meth)acryl group can be bonded (title; abstract, line 1-5). Therefore, Lesniak’s Si-containing modifier anticipates the two claimed modifying groups (A) and (C).

8. Regarding **Claim 3**, the surface of Lesniak’s iron oxide nanoparticles certainly carries at least some residual hydroxyl groups as known in the art for all metal oxides.

Regarding **Claims 20 and 22**, iron oxide is a compound of iron metal in the form of oxide.

Remaining dependent **Claims 2, 4-6, 9-12 and 30** are thereby rejected with the same reason for the rejection of Claims 1, 3, 20 and 22.

9. Claims 1-3, 5, 8-12, 20-22 and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Adams et al. (US 6,649,138 B2 with US filing date of April 23, 2001).

Regarding the limitation of parent **Claim 1**, Adams et al. have already disclosed a process for preparing **surface modified semiconductive and metallic nanoparticles** having enhanced dispersibility in aqueous media. Such a surface-modified coating is achieved by addition of a solution of **a multiply amphipathic dispersant which is a polymeric compound having at least two hydrophobic regions and at least two hydrophilic regions** (tile; abstract, line 1-10; column 13, line 34-62; column 4, line 63 – column 5, line 7). **Hydrophilic regions** may include polar functional groups such as carboxylic acid, sulfonic acid, hydroxyl group and the like (column 14, line 16 – column 15, line 44; particularly see column 14, line 44-49 for acid; column 15, line 36-44 for alcohol). **Hydrophobic regions** may include various types of hydrocarbon units useful as inert and/or linking groups (column 15, line 45 – column 16, line 16; column 13, line 34-62). Therefore, Adams's amphipathic modifier anticipates the two claimed modifying groups (A) and (B).

10. Regarding **Claim 3**, surface of Adams' semiconductor nanoparticles such as ZnS, GaAs and the like (column 12, line 13-25) as well as metallic alloy (column 12, line 63 – column 13, line 10) certainly carries at least some residual hydroxyl groups as known in the art.

Regarding **Claims 20-22**, please see Adams' disclosure from column 12 at line 13 to column 13 at line 33.



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Remaining dependent **Claims 2, 5, 8-12 and 30** are thereby rejected with the same reason for the rejection of Claims 1, 3 and 20-22.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 7-8, 13-19, 21, 23-25 and 31-32 are rejected 35 U.S.C. 103(a) as being unpatentable over Lesniak et al. (WO 97/38058) in view of Groth et al. (EP 872,500 A1).

The discussion of the disclosures of the prior art of Lesniak et al. for Claims 1-6, 9-12, 20 and 22 of this office action is incorporated here by reference. Regarding **Claims 7-8, 13-19, 21,**

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**23-25 and 31-32, Lesniak is silent of at least five things such as:** (A) using a blocked isocyanate group as modifier's functional group (Claims 7 and 8), (B) using silicon-containing modifier compounds as specified (Claims 13-19), (C) using the claimed metal or metal oxide (Claim 21), (D) using more than one modifiers and in the claimed solvent mixture (Claims 23-25 and 32), and (E) modifier carrying carbon-carbon multiple bonds for actinic radiation induced coupling (Claim 31). **Groth et al. have taught all explicitly and/or implicitly as disclosed in international search report of WO 2004/035649 A1 to Poppe et al. for PCT/ET03/10922.**

For instance, see abstract, line 1-4; see page 2, line 30-45; page 3, lines 4-10 and 36-55 for the claimed silicon-containing modifiers; see carbon-carbon multiple bonds on the R<sup>1</sup> group (page 4, line 29-30); see colloidal oxides of titanium, zirconium, tungsten and the like (abstract, line 1-4). By doing so, the advantage is such surface-modified nanoparticles are found to be very useful in making products of hard and thick coatings with high scratch resistance, high chemical resistance and excellent adhesion to plastic without using a primer (see abstract, lines in advantage section).

13. In light of the fact that both involving references are making surface-modified nanoparticles, one having ordinary skill in the art would therefore have found it obvious to modify Lesniak's composition and its process of making **by following all the above-mentioned disclosure** as taught by Groth. By doing so, one would expect all embodiments in the same genus would succeed. Additionally, with an advantage as products of hard and thick coatings with high scratch resistance, high chemical resistance and excellent adhesion to plastic without using a primer can be effectively obtained, and thereby producing a persistent, reliable and long-lasting product.

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14. Claims 4, 6-7, 13-19, 23-25 and 31-32 are rejected 35 U.S.C. 103(a) as being unpatentable over Adams et al. (US 6,649,138 B2) in view of Groth et al. (EP 872,500 A1).

The discussion of the disclosures of the prior art of Adams et al. for 1-3, 5, 8-12 and 20-22 of this office action is incorporated here by reference. Regarding **Claims 4, 6-7, 13-19, 23-25 and 31-32, Adams is silent of at least four things** such as: (A) using a silicon-containing blocked isocyanate group as modifier's functional group (Claims 4 and 6-7), (B) using silicon-containing modifier compounds as specified (Claims 13-19), (C) using more than one modifiers and in the claimed solvent mixture (Claims 23-25 and 32), and (D) modifier carrying carbon-carbon multiple bonds for actinic radiation induced coupling (Claim 31). **Groth et al. have taught all explicitly and/or implicitly as disclosed in international search report of WO 2004/035649 A1 to Poppe et al. for PCT/ET03/10922**). For instance, see abstract, line 1-4; see page 2, line 30-45; page 3, lines 4-10 and 36-55 for the claimed silicon-containing modifiers; see carbon-carbon multiple bonds on the R<sup>1</sup> group (page 4, line 29-30); see colloidal oxides of titanium, zirconium, tungsten and the like (abstract, line 1-4). By doing so, the advantage is such surface-modified nanoparticles are found to be very useful in making products of hard and thick coatings with high scratch resistance, high chemical resistance and excellent adhesion to plastic without using a primer (see abstract, lines in advantage section).

15. In light of the fact that both involving references are making surface-modified nanoparticles, one having ordinary skill in the art would therefore have found it obvious to

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modify Adam's composition and its process of making **by following all the above-mentioned disclosure** as taught by Groth. By doing so, one would expect all embodiments in the same genus would succeed. Additionally, with an advantage as products of hard and thick coatings with high scratch resistance, high chemical resistance and excellent adhesion to plastic without using a primer can be effectively obtained, and thereby producing a persistent, reliable and long-lasting product.

### *Conclusion*

16. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. The following references relate to surface-modified nanoparticles whose surface is covered completely or near-completely with modifying group(s):

US Patent No. **6,444,143 B2 to Bawendi et al.** disclose the preparation of water-soluble fluorescent nanocrystals by attaching a modifier containing a hydrophilic group, a linking group and a hydrophobic group (abstract, line 1-15; see all figures; column 3, line 27-33). The linking group may include compounds having **lone electronic pairs** available for interaction with the semiconductor surface, such as from oxygen, sulfur, nitrogen and phosphorus (column 7, line 56-67). **It is thereby NOT covalently bonded** to the surface of nanoparticles. Therefore, Bawendi fails to teach or fairly suggest the limitation of present invention.

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17. Any inquiry concerning this communication or earlier communication from the examiner should be directed to **Dr. Henry S. Hu whose telephone number is (571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The **fax** number for the organization where this application or proceeding is assigned is **(571) 273-8300** for all regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Henry S. Hu

Patent Examiner, Art Unit 1713, USPTO

June 16, 2006



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